

FIG. 1

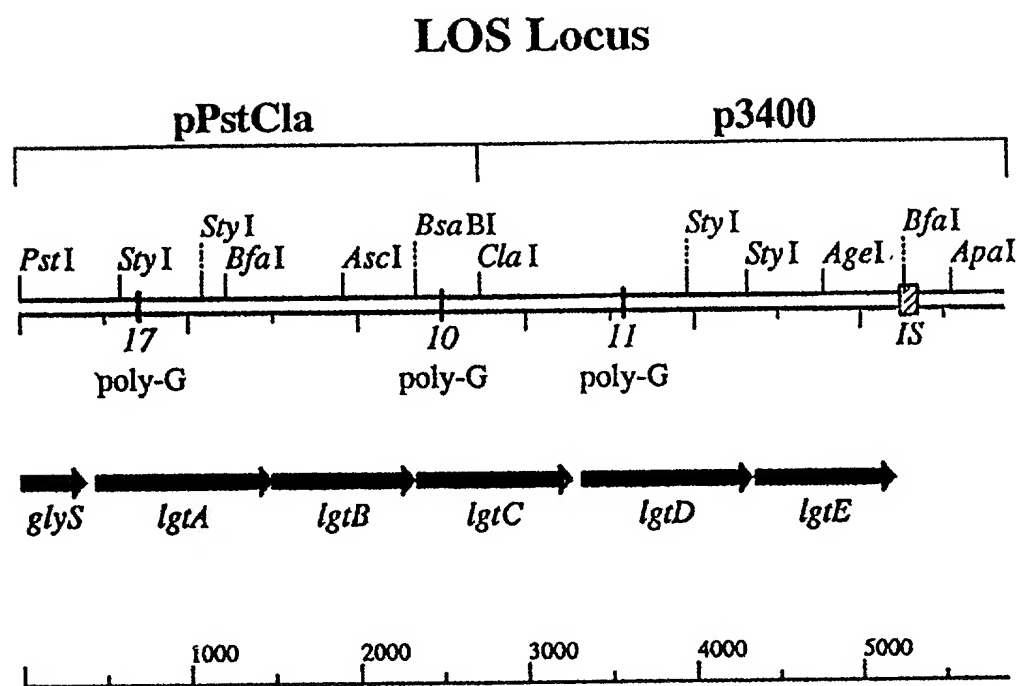


FIG.2A

## FIG.2B-1

SOURCE Neisseria gonorrhoeae.  
 ORGANISM Neisseria gonorrhoeae  
 source 1..5859

CDS  
 <1..381  
 /gene="glys"  
 /codon\_start=1  
 /transl\_table=11  
 /product="glycyl tRNA synthetase beta chain"

/translation="LQAVAVFKQLPEAAALAAANKRVQNLKKADAALGEVNESLLQQ  
 DEEKALYAAAQGLQPKIAAAVAEGNFRITALSELASVKPQVDAFFDGVVMVAEDAAVKQ  
 NRLNLLNRLAEQMNAVADIALLGE"

CDS  
 445..1491  
 /gene="lgtA"  
 /codon\_start=1  
 /function="adds GlcNAc to lacto-N-neotetraose chain of  
 gonococcal LOS"  
 /evidence=experimental  
 /transl\_except=(pos:445..447,aa:Met)  
 /transl\_table=11  
 /product="glycosyl transferase"

/translation="MQPLVSVLICAYNVEKYFAQSLAAVNVQWTRNLDILLVDDGSTD  
 GTLAIADKDFQKRDSRIKILAQNSGLIPSLNIGLDELAKSGGGGEYIARTDADDIA  
 SPGWIEKIVGEMEKDRSIIAMGAWLEVLSEKDGNRILARHHKHGKIWKKPTRHEDIAA  
 FPFPGNPITHNNTMIMRRSVIDGGLRYDTERDWAEDYQFWYDVSKLGRLAYYPEALVKY  
 RLHANQVSSKHSVRQHEIAQGIQKTARNDFLQSMGFKTRFDSLEYRQTKAAAYELPEK  
 DLPEEDFERARRFLYQCCKRRTDTPPSGAWLDFAADGRMRRLFTLRQYFGILYRLIKNR  
 RQARSDSAGKEQEI"

## FIG.2B-2

CDS

```

1491..2330
/gene="lgtB"
/codon_start=1
/function="adds second galactose to the lacto-N-tetraose
chain in LOS"
/evidence=experimental
/product="glycosyl transferase"

```

```

/translation="MQNHVISLASAERRAHIAATFGSRGIPFQFFDALMPSERLERA
MAELVPGLSAHPYLSGVEKACFMASHAVLWEQALDEGVPIAVFEDDVLLGEGAEQFLA
EDTWLQERFDPDSAFVVRLETFMFHVLITSPSGVADYGGRAFPLLESEHCGTAGYIISR
KAMRFFLDRAVLPPERLHPVDLMMFGNPDDREGMPVCQLNPALCAQELHYAKFHDQN
SALGSLIEHRRRLNRKQQRDSPANTFKHRLIRALTIGRERERKRQRREQLIGKIIV
PFQ"

```

CDS

```

2342..3262
/gene="lgtC"
/codon_start=1
/function="adds galactose alpha(1-4) to Gal-Glc in
gonococcal LOS"
/evidence=experimental
/transl_table=11
/product="glycosyl transferase"

```

```

/translation="MDIVFAADDNYAAYLCVAAKSVEAAHPDTEIRFHVLDAGISEEN
RAAVAANLRGGNIRFIDVNPEDFAGFPINIRHISITTYARLKLGEYIADCCKVLYLD
TDVLVRDGLKPLWDTDLGGNWVGACIDLFVERQEGYKQKIGMADGEYFYNAGVLLINL
KKWRRHDI FKMSCWEVQYKDVMOYQDDQDILNGLFKGGVCYANSRNFNFMPTNYAFMAN
GFASRHTDPLYLDRNTAMPVAVSHYCGSAKPWHRDCTVWGAERFTELAGSLTTPPEE
WRGKLAVPPTKCMQLQRWRKKLSARFLRKIY"

```

3322..4335

3322..4335

```

/gene="lgtD"
/codon_start=1
/function="adds terminal GalNAc to lacto-N-neotetraose
chain of LOS"
/evidence=experimental
/transl_except=(pos:3322..3324,aa:Met)
/transl_table=11
/product="glycosyl transferase"

```

translation="MQPLVSVLICAYNAEKYFAQSLAAVVGGQTRWNLDILIVDDGSTD  
GTPAIARHFQEQDGRIRIISNPRNLGFIASNLNIGLDELAKSGGGEYIARTDADDIASP  
GWIEKIVGEMEKDRSIIAMGAWLEVLSENNKSVLAAIARNGAIWDKPTRHEDI VAVF  
VGNPIHNNMTIMRRSVIDGGLRFPDPAITHAEDYKFWYEA GKLGRLAYYPEALVKYRF  
HQDQTSSKYNLQRRRTAWKIKEEIRAGYWKAAAGI AVGADCLNYGLLKSTAYALYEKAL  
SSGQDIGCLRFLFYEFYLSLEKYSLTDLLDELTD RVMRKLFAAPQYRKILKKMLRPWKY  
SSY"

```
CDS
4354..5196
/gene="lgtE"
/codon_start=1
/function="adds first galactose to lacto-N-neotetraose
chain of LOS"
/evidence=experimental
/trans1_table=11
/product="glycosyl transferase"
```

```

/translation="MQNHVISLASAAERRAHLADTFGSRGIPFQFFDAMPSERLAQ
MAELVPGLSAHPYLSGVEKACFMASHAVIWEQALDEGLPIAVFEDDVLLEGAEQFLA
EDTWLEERFDKDSAFIVRLETMTFAKVIVRPDKVLNYENRSFPLLESEHCGTAGYIISR
EAMRFFLDREFAVLPPERIKAVDLMFTYFFDKEGMPVYQVSPALCTQELHYAKFLLSQN
SMLGSDLEKDREQRRHRRSLKVMFDLKRALGKFGREKKRMERQQAELKVVYGRRV
TLEK"

```

FIG.2B-4

BASE COUNT	1412 a	1462 c	1661 g	1324 t
ORIGIN				
1	ctgcaggccg	tcgcccgtatt	caaaacaactg	cccgaagccg
61	aaacgcgtgc	aaaacccgtct	gaaaaaagcc	gatgccgcgt
121	ctgctgcaac	aggacgaaga	aaaagccctg	tacgctgccg
181	attgccgccg	ccgtcgcgca	aggcaatttc	cgaaccgcct
241	aagccgcagg	ttgatgcctt	cttcgacggc	gtgatggtga
301	aaacaaaacc	gcctgaacct	gctgaaccgc	ttggcagagc
361	atcgcgcttt	tgggcgaagta	accgttgtac	agtcacaatg
421	gcatcaaat	atcgggagag	taaatctgag	cctttagtca
481	aacgtagaaa	aatatcttgc	ccaatcatta	gccgccgtcg
541	ttggatat	tgattgtcga	tgacggctcg	acagacggca
601	tttcaaaaagc	gggacagccg	tatcaaaatc	ccttgcaaaag
661	ccctctttaa	acatcgggct	ggacgaattg	gcaaagtccg
721	attgcgcgca	ccgatgccga	cgatatcgcc	tcccccggt
781	gagatggaaa	aagaccgcag	catcatcgcg	atgggcgcgt
841	gaaaaggacg	gcaaccggct	ggcgcgccac	cacaaacacg
901	accgggcacg	aagacatcgc	cgcccttttc	cctttcggca
961	atgatctatgc	ggcgacgcgt	cattgacggc	ggtttgcgtt
1021	gcggaagatt	accaattttg	gtacgatgtc	agcaaatctg
1081	gaagccttgg	tcaaatatccg	ccttcacgcc	aatcagggtt
1141	caacacgaaa	tcgcgcgaag	catccaaaaa	accgccagaa
1201	ggttttaaaa	ccgggttcga	cagccctagaa	taccgccaaa
1261	ctgccggaga	aggattttgc	ggaagaagat	tttgaacgcg
1321	tgcttcaaac	ggacggacac	gccgccctcc	ggcgcgctggc
1381	aggatgaggc	ggctgtttac	cctgaggcaa	tacttcggca
1441	aaccgccggc	aggcgcggtc	ggattcggca	gggaaagaac
1501	acgttatcag	cctgggttcc	gccgcagaac	gcagggcgca
1561	gtcgcggcat	cccgttccag	tttttcgacg	cactgatgcc

## FIG.2B-5

1621 caatggcggg actcgtcccc ggcttgctgg cgacccccta tttgagcggg gtggaaaaag  
1681 cctgctttat gagccacgcc gtattgtggg aacaggcatt ggacgaaggc gtaccgtata  
1741 tcgccgtatt tgaagatgat gtcttactcg gcgaaggcgc ggagcagttc cttgccgaag  
1801 atacttggct gcaagaacgc tttgaccccc attccgcctt tgcgtccgc ttggaacga  
1861 tgtttatgca cgtcctgacc tcgccctccg gcgtggcggg ctacggcggg cgcgcctttc  
1921 cgcttttggg aagcgaacac tgcgggacgg cggtctatat tattccccg aaggcgtgc  
1981 gttttttctt ggacaggttt gccgttttgc cgccgaacg cctgcacct gtcgatttga  
2041 tgatgttcgg caaccctgac gacagggaag gaatgccgggt ttgccagctc aatccgcct  
2101 tgtgcgccc agagctgcat tatgccaaat ttacagacca aaacagcgca ttgggcagcc  
2161 tgatcgaaca tgaccgcgc ctgaaccgca aacagcaatg gcgcgattcc cccgccaaaca  
2221 cattcaaca ccgcctgac ccgccttga ccaaatcgg cagggaagg gaaaaacgcc  
2281 ggcaaggcgc gaaacagtta atcggcaaga ttattgtgcc ttccaataa aaggagaaaa  
2341 gatggacatc gtatttgccg cagacgacaa ctatgccgc ctactttgcg ttgcggcaaa  
2401 aagcgtggaa gcggcccat ccgatacgg aatcaggttc cactcctcg atgcggcat  
2461 cagtgaaggaa aaccggcgg ccgttgccgc caatttgccg ggggggggta atatccgctt  
2521 tatagacgta aaccgcgaag attcgcccg ctcccttca aacatcaggc acatttccat  
2581 tacgacttat gccgcctga aattgggcga atacattgcc gattgcgaca agtcctgta  
2641 tctggatacg gacgtattgg tcagggacgg cctgaagccc ttatgggata ccgatttggg  
2701 cggtaaactg gtccgcgcgt gcatcgattt gtttgtcgaa aggcagggaag gatacaaca  
2761 aaaaatcgg atggcgagc gagaatatla ttccaatgcc ggcgtattgc tgatcaacct  
2821 gaaaagtgg cggcggcacg atattttcaa aatgtcctgc gaatgggtgg aacaatacaa  
2881 ggacgtgatg caatatcagg atcaggacat ttggaacggg ctgtttaaag gcggggtgtg  
2941 ttatgcgaac agccgtttca actttatgcc gaccaattat gcctttatgg cgaacgggtt  
3001 tgcgtccgc cataccgac cgctttacct cgaccgtacc aatacggcga tgcctgtcgc  
3061 cgtcagccat tattgcggct cggcaagcc gtggcacagg gactgcaccg tttgggggtgc  
3121 ggaacgtttc acagagtgg ccggcagcct gacgaccgtt ccgaaagaat ggccgcggcaa  
3181 acttgccgtc ccgccgacaa agtgtatgct tcaaatggg cgcaaaaaagc tgtctgccag  
3241 attcttacgc aagatttatt gacggggcag gccgtctgaa gccttcagac ggcatacggac  
3301 gtatcggaag ggagaaacgg attgacgct ttagtcagcg tattgatttg cgcctacaac  
3361 gcagaaaaat attttgccc atcattggcc gccgtagtgg ggcagacttg gcgcaacttg

FIG.2B-6

3421 gatattttga ttgtcgatga cggctcgacg gacggcacgc cggccattgc ccggcatttc  
3481 caagaacagg acggcaggat caggataatt tccaatcccc gcaatttggg ctttatcgcc  
3541 tctttaaaca tcgggctgga cgaattggca aagtcggggg ggggggaata tattgcgcgc  
3601 accgatgccg acgatattgc ctccccggc tcgattgaga aaatcgtggg cgagatggaa  
3661 aaagaccgca gcatcattgc gatggggcgc tgggtggaa tttgtcggg agaaaaaat  
3721 aaaagcgtgc ttgccgccat tgcccgaac ggcgcaattt gggacaacac gaccggcat  
3781 gaagacattg tcgccgtttt cctttcggc aacccatcac acaacaacac gatgattatg  
3841 aggcgcagcg tcattgacgg cggtttgagg ttcgatccag cctatatcca gccgaagac  
3901 tataagtttt ggtacgaagc cggcaaatcg ggcaggctgg ctatatcc cgaagccttg  
3961 gtcaaatacc gcttccatca agaccagact tcttccaat acaacctgca acagcgagg  
4021 acggcgtgga aaatcaaga agaatcagg gcggggtatt ggaaggcggc aggcatagcc  
4081 gtcggggcgg actgcctgaa ttacgggctt ttgaaatcaa cggcataatgc gttgtacgaa  
4141 aaagccttgt ccggacagga taccggatgc ctccgcctgt tcctgtacga atatttcttg  
4201 tcgttggaag agtattcttt gaccgatttg ctggatttct tgacagaccg cgtgatgagg  
4261 aagctgtttg ccgcaccgca atataggaaa atcctgaaaa aaatgttacg cccttggaag  
4321 taccgcagct attgaaaccg gcacattgac gataacctcg gcagtcgcgg accccgttc  
4381 tccgccgcag agcgcaggc gccgtctgaa agcctggaa agcctgctt tatgagccac  
4441 cagtttttcg acgcactgat ctatttgagc ggagtggaaa aagcctgctt atttgaggac  
4501 ccggccttgt gggaacaggc gttggatgaa ggtctgccgt atatcgccgt gttggaagag  
4561 gccgtattgt tcggcgaaag cgcggagcag ttccttgccg aagatacttg cgaagtatt  
4621 gacgttttac aggtattccg ctttatcgtc cgtttggaaa cgatgtttgc gaaagtatt  
4681 cgttttgaca aggtattccg gaattatgaa aaccggtcat ttcctttgct ggagagcgaa  
4741 gtcagaccgg ataaagtcct tatcatttcg cgtgaggcga tgcggtttt cttggacagg  
4801 cattgtgga cggctggcta tgccgccaga gcggtagatt tcatgatggt tacttatttc  
4861 tttgccgttt aggggatgcc tgtttatcag ggttagtccc ccttatgtac ccaagaattg  
4921 tttgataagg aggttcctag tcaaaaacagt atgttgggta cgcatttggg aaaagatagg  
4981 cattatgcca agtttctcag ccgttcgttg aaggtgatgt ttgacttgaa gcgtgctttg  
5041 gaacaaggaa gaagacaccg ccgttcgttg aaggtgatgt ttgacttgaa gcgtgctttg  
5101 ggtaaattcg gtagggaaaa atggagcgtc aaaggcaggc ggagccttgag  
5161 aaagtttacg gcaggcgggt catattgttc aaatagtctg tgtaaatat aggggattaa

## FIG.2B-7

5221 aatcagaaat ggacacactg tcattcccgc gcaggcggga atctaggtct ttaacttcg  
5281 gttttttccg ataaattctt gccgcattaa aattccagat tcccgctttc gcgggggatga  
5341 cggcggggg attgttgctt ttccggataa aatcccgtgt ttttcatct gctaggtaaa  
5401 atcgcccca agcgtctgca tcggggcgat ggcggcgagt ggggcggttt ctgtgcgtaa  
5461 aatccgtttt ccgagtgtaa ccgcctgaaa gccggcttca aatgcctgtt gttcttcctg  
5521 ttctgtccag ccgccttcgg gcccgacct aaagacgatt gcgccggacg ggtggcggat  
5581 gtcgccgagt ttgcaggcgc ggttgatgct cataatcagc ttggtgtttt cagacggcat  
5641 ttgtcgagt gcttcacggt agccgatgat gggcagtagc gggggaacgg tgttcctgcc  
5701 gctttgttcg caccggaga tgacgatttc ctgccagcgt gcgaggcgtt tggcggcgcg  
5761 ttctccgtcg aggcggacga tgcagcgttc gctgatgacg ggctgtatgg cggttacgcc  
5821 gagtccgacg cttttttgca ggtgaaatc catgcgac

1gtA 1 LQPLVSVLICAYNVEKYFAQSLAAVVNQTWNRNLDILIVDDGSTDGTLAIA 50  
1gtD 1 LQPLVSVLICAYNAEKYFAQSLAAVVGQTWNRNLDILIVDDGSTDGTPAIA 50  
1gtA 51 KDFQKRDSRIKILAAQANSGLIPSLNIGLDELA KSGGGGGEYIARTDADD 100  
1gtD 51 RHFEQDGRIRIISNPRNLGFIA SLNIGLDELA KS..GGGEYIARTDADD 98  
1gtA 101 IASPGWIEKIVGEMEKDRSIIAMGAWLEVLSEEKDNRLARHHKHGKIWK 150  
1gtD 99 IASPGWIEKIVGEMEKDRSIIAMGAWLEVLSEENKSVLAAIARNGAIWD 148  
1gtA 151 KPTRHEDIAAFFPFGNP IHNNTMIMRRSVIDGGLRYDTERDWAEDYQFWY 200  
1gtD 149 KPTRHEDIVAVFPFGNP IHNNTMIMRRSVIDGGLRFDPAYIHAEDYKFWY 198

**FIG. 3A**

[illegible]

**FIG. 3B**

1gtB 1 MQNHVISLASAAERRAHIADTFGSRGIPFQFFDALMPSERLEQAMAE LVP 50  
1gtE 1 MQNHVISLASAAERRAHIADTFGSRGIPFQFFDALMPSERLEQAMAE LVP 50  
1gtB 51 GLSAHLYLSGVEKACFM SHAVLWEQALDEGLPYIAVFEDDVL LGEAEQF 100  
1gtE 51 GLSAHPYLSGVEKACFM SHAVLWEQALDEGLPYIAVFEDDVL LGEAEQF 100  
1gtB 101 LAEDTWLQERFDPDSAFVVRLETMFMHVL TSPSGVADYGGRAFPL LESEH 150  
1gtE 101 LAEDTWLEERFDKDSAFIVRLETMFAKVI VRPDKVLN YENRSFPLLESEH 150  
1gtB 151 CGTAGYIISRKAMRFFLDRFAVLPPERLHPVDLMMFGNPDDREGMPVCQL 200  
1gtE 151 CGTAGYIISRREAMRFFLDRFAVLPPERIKAVDLM MFTYFFDKEGMPVYQV 200

**FIG. 4A**

1gtB 201 NPALCAQELHYAKFHDQNSALGSLIEHRRRLNRKQQRDSPANFHKHRLI 250  
1gtE 201 SPALCTQELHYAKFLSQNSMLGSDLEKD...REQGRRHRRSLKVMFDLK 246  
1gtB 251 RALTKIGREREKRRRR...EQTIGKIIVPFQ 279  
1gtE 247 RALGKFGREKKRMRERQAELEKVGRRVILFK 280

FIG.4B

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rfaI 29 LDIAYGTDKNFLFGCGISIASILKYNEGSRLCFHIFTDYFGDDDRKYFDA 78  
1gtc 1 MDIVFAADDNYAAYLCVAAKSVEAAHPDTEIRFHVLDAGISEENRAAVAA 50

rfaI 79 LALQYKTRIKIYLINGDRLRLP.STKNWTHAIYFRFVIADYFINKAPKV 127  
1gtc 51 .NLRGGNIRFIDVNPEDFAGFPLNIRHISITTYARLKLGEY.IADCDKV 98

rfaI 128 LYLDADIICQGTIEPLINFSPDDKVAMVV...TEQQADWWEKRAHSLGV 174  
1gtc 99 LYLDTDVLVRDGLKPLWDTDLGGNWWGACIDL FVERQEGYKQK...IGM 144

rfaI 175 AGIAKGYFNSGFLINTAQWAAQQVSARAIAMLNEPEI IKKITHPDQDVL 224  
1gtc 145 AD.GEYFYNAGVLLINLKKWRRHDI FKMSCWVEQYKDVMQ..YQDQDIL 191

FIG.5A

```

rfaI 225 NMLLADKLIFADIKYNTQFSLNYQLKESFINPVTNDTIFI..... 264
      ||: : : : : : : : : : : : : : : : : : : : : : : : :
1gtC 192 NGLFKGGVCYANSRNF.MPTNYAFMANGFASRHTDPLYLDRNTAMPVA 240
      ||: : : : : : : : : : : : : : : : : : : : : : : : :

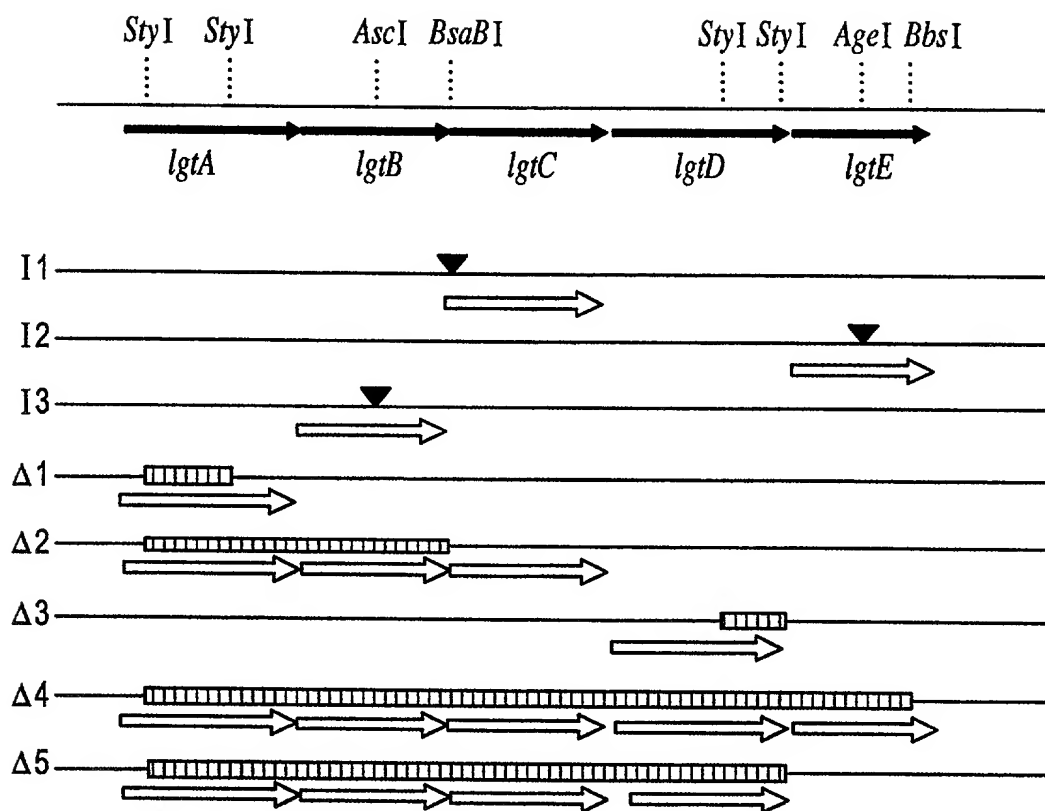
rfaI 265 ..HYIGPTKPWHDWADYPVSQAFMEAKNASPWKNTALLKPNNSQLRYS 312
      ||: : : : ||: : : : ||: : : : ||: : : : ||: : : : ||: : : :
1gtC 241 VSHYCGSAKPWH...RDCTVWGAERFTELAGSL..TTVPEEWRGKLAVPP 285
      ||: : : : ||: : : : ||: : : : ||: : : : ||: : : : ||: : : :

rfaI 313 AKHMLKKHRYLKGFSNYLFYFI 334
      ||: : : : ||: : : : ||: : : : ||: : : : ||: : : : ||: : : :
1gtC 286 TKCML..QRWRKKLSARFLRKI 305
      ||: : : : ||: : : : ||: : : : ||: : : : ||: : : : ||: : : :

```

**FIG. 5B**

FIG.6



SECRET

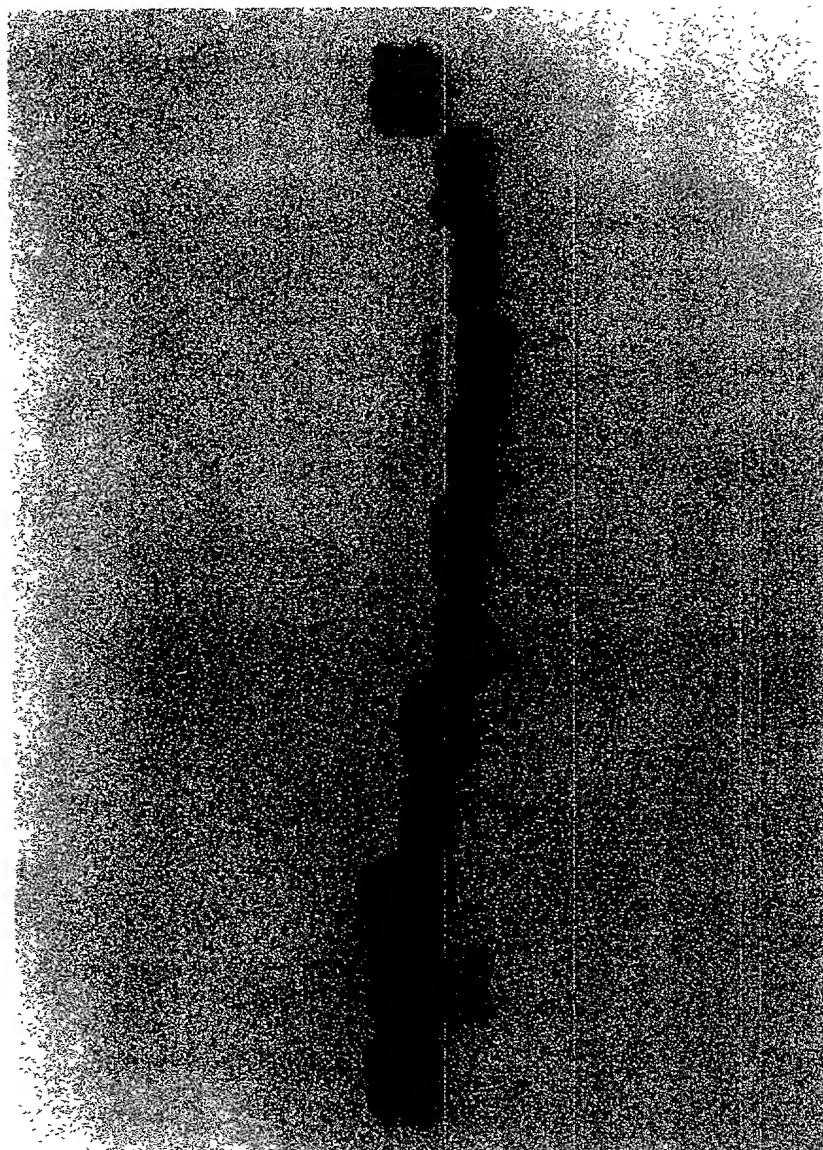


FIG. 7

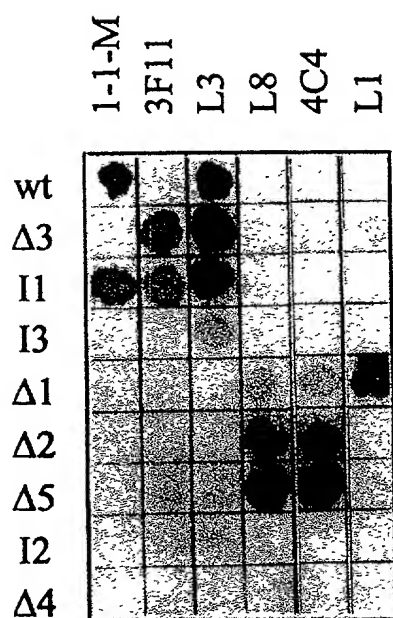


FIG.8